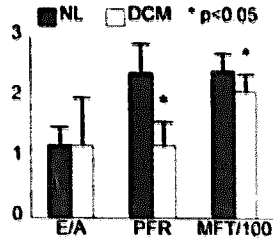
based on transmittal blood flow velocities. We hypothesized that Color Kinesis (CK), which allows direct quantification of the magnitude and timing endocardial motion can identify diastolic dysfunction in patients with DCM and MR.

Methods: We studied 24 patients with DCM (EF ≤25%, end-diastolic dimension ≥6.8 cm) and moderate to severe MR, and 24 age-matched normal subjects (NL). Diastolic CK images were analyzed to obtain peak filling rate normalized by heart rate (PFR, in units of end-diastolic area per beat) and mean filling time normalized by RR interval (MFT). Peak E and A velocities, and E/A ratios were obtained from Doppler tracings.

Results: Doppler filling parameters measured in patients with DCM and MR were not significantly different from normal mean values: peak E = 79 ± 12 vs 87 ± 37 cm/s, and peak A = 67 ± 17 vs 87 ± 33 cm/s. In contrast, PFR and MFT obtained from CK images were significantly reduced in patients with DCM despite the presence of MR.



Conclusions: Color Kinesis allowed identification of diastolic dysfunction in patients with DCM in whom Doppler assessment of diastolic function was confounded by MR.

1101 Noninvasive Imaging: Comparison of Different Stress Techniques I

Tuesday, March 31, 1998, 9:00 a.m.–11:00 a.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 9:00 a.m.–10:00 a.m.

1101-119 Myocardial Oxygen Consumption During Dobutamine and Exercise Stress: Is it Equivalent?

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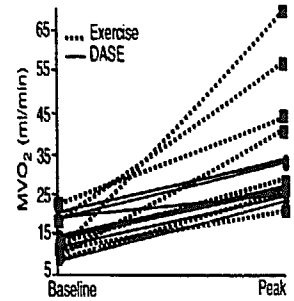
Dobutamine atropine stress echocardiography (DASE) has limitations in detecting myocardial ischemia. We hypothesized that myocardial oxygen consumption (MVO_2) at peak DASE is lower compared with peak exercise.

Methods: We studied 7 male patients (pts) (LVEF ≥60%; age 48 ± 10 yr), 5 with CAD (≥50% stenosis). Each pt exercised maximally on a supine bike followed 1 hour later by DASE. Coronary sinus (CS) blood flow, using a CS catheter, right-sided and systemic pressures, systemic oxygen consumption (VO_2) and digital 2D echo were acquired at each 3 min stage, for each study. Cardiac output (CO) (l/min) and MVO_2 (ml/min) were calculated by Fick.

	MVO_2	HR	DP	CO	ESWS	VO_2
baseEx	14 ± 5	62 ± 6	9.5 ± 0.9	6 ± 1	44 ± 16	3.6 ± 0.7
baseDSE	16 ± 4	68 ± 7	9.7 ± 1.1	7 ± 2	36 ± 11	3.9 ± 1.1
peakEx	40 ± 18	127 ± 10	24.0 ± 3	16 ± 3	32 ± 18	20.3 ± 5
peakDSE	26 ± 4	149 ± 14	24.8 ± 3	11 ± 3	26 ± 12	4.6 ± 1.0
P value	0.09	0.004		0.004	0.07	

Heart rate (HR), double product × 10^3 (DP), end systolic meridional wall stress (ESWS) (dynes/cm^2), VO_2 (ml/kg/min). P compares peakEx and peak DSE



Results: See table and figure.

Conclusions: DASE likely understresses the heart compared with exercise. This is poorly predicted by the HR and DP response. Modification of DASE to increase ESWS may increase MVO_2.

1101-120 Comparison of Enoximone Echocardiography, Positron Emission Tomography and Dobutamine Echocardiography for Prediction of Recovery of Myocardial Dysfunction After Revascularization

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Background: This study sought to evaluate whether infusion of enoximone, a nonglycoside, noncatechol positive inotropic agent in combination with 2-D echo (EE) is comparable to dobutamine echo (DE) and PET for prediction of functional recovery after revascularization.

Methods: 35 pts with chronic coronary disease and LV dysfunction elected for revascularization were studied with DE (dobutamine 5 to 10 μg/kg/min) and EE (enoximone 1.5 mg/kg, over 10') on two separated sessions one week before intervention. Myocardial uptake of FDG on PET was also performed in a subset of 13 pts. Systolic function was scored from 1 (normal) to 4 (dyskinesia) and FDG uptake was scored from 0 (absence) to 3 (high). A basally asynergic segment was considered contractile enhancement as a wall motion score change ≥1 grade and was defined as viable as a FDG uptake score ≥2 grade. Functional recovery was determined by a rest echo 3 months after revascularization.

Results: Of total 560 LV segments, 192 were classified as hypo- and 153 as akinetic on baseline echocardiography. Of these, 318 were successfully revascularized. Revascularization resulted in functional recovery in 67 of 167 hypokinetic segments (40%) and in 40 of 151 akinetic segments (26%, $p < 0.05$). The sensitivity and specificity in predicting function recovery were 78% and 85% for DE and 84% and 88% for EE, respectively. Positive and negative predictive value was similar (DE = 72% vs EE = 78%, and DE = 91% vs EE = 94%, respectively). PET viability by FDG uptake criteria had a similar sensitivity (75%) with a lower specificity (64%, $p < 0.01$, vs EE and DE) for functional recovery. Concordant interpretation of EE and DE was found in 92% (291/318) of affected segments (102 recovered and 189 remained unchanged).

Conclusions: EE has a comparable accuracy with DE for prediction of functional recovery following revascularization. In this study, presence and extent of contractile enhancement during EE and DE as well as at follow up were relatively less than those defined as viable on FDG uptake.

1101-121 Meta-analytic Comparison of Echocardiographic Stressors

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Background: Many studies have reported conflicting results on test characteristics of various echocardiographic stressors for detecting coronary artery disease (CAD). To evaluate the test characteristics of echocardiographic stressors, we performed a meta-analytic comparison.

Methods: A MEDLINE search from 1966 to 1995 yielded 393 articles, of which 128 studies met predefined inclusion criteria for stress echocardiography with exercise, adenosine, dobutamine, dipyridamole, and trans-atrial pacing as stressors. Using the meta-analytic methodology of Littenberg & Moses, we pooled the results of 128 studies to form Summary ROC (SROC) curves for each stressor. Linear regression of transformed ROC curves was used to compare the test characteristics for each group of pooled studies. To explore the effects of patient population and study design differences, we also performed meta-regression analyses using logistic regression method with robust variance estimate.

Results: Based on area under the SROC curve (a summary measure of test performance), the SROC curve analysis suggested that exercise stress was superior to the other four stressors. Linear regression of these curves showed this effect to be statistically significant in exercise vs. dobutamine and exercise vs. dipyridamole. Meta-regression revealed that 1) exercise stress was more sensitive and specific than adenosine stress; 2) exercise stress was more sensitive than dobutamine stress and 3) exercise stress was more sensitive but less specific than dipyridamole stress. Including patients with a history of exertional angina increased study sensitivity. Older studies had a lower specificity.

Conclusion: Results of the ROC curve analysis suggested that exercise stress is generally superior to the common pharmacological stressors, dobutamine and dipyridamole. Exercise stress should be considered as a first-line stress procedure if possible.